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DYSLEXIA--READING DISABILITY WITH NEUROLOGICAL INVOLVEMENT.

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THE SYMPTOMATOLOGY AND TREATMENT OF DYSLEXIA ARE DISCUSSED. A DESCRIPTION OF THE DYNAMIC NATURE OF DYSLEXIA, INCLUDING VISUAL PERCEPTION, AUDITORY PERCEPTION AND SPEECH, NEUROLOGICAL ABNORMALITIES, AND AUDITORY-VISUAL RELATIONSHIPS, IS PRESENTED. TREATMENT FOR DYSLEXIC CHILDREN IS DEPENDENT ON DIAGNOSIS AND CONSTANT EVALUATION. SOME METHODS OF TEACHING READING ARE DESCRIBED. ALTHOUGH PRESENT PROSPECTS FOR DYSLEXIC CHILDREN ARE NOT FAVORABLE, SOME PROGRAMS FOR LEARNING DISABILITIES ARE BECOMING AVAILABLE. HOWEVER, DIAGNOSIS IS DIFFICULT, AND SPECIAL METHODS OF INSTRUCTION ARE SELDOM BEGUN EARLY ENOUGH TO AVOID EMOTIONAL INVOLVEMENT. A BIBLIOGRAPHY IS INCLUDED. (BK)

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DYSLEXIA: READING DISABILITY WITH NEUROLOGICAL INVOLVEMENT

by

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DYSLEXIA: READING DISABILITY WITH NEUROLOGICAL INVOLVEMENT

Symptomatology of Dyslexia

Introduction

Many children with adequate intelligence are not learning to read well enough to make satisfactory progress in school. The National Council of Teachers of English estimated in 1961 that nearly four million of the thirty-three million children then in elementary school were seriously retarded in reading (DeHirsch, 1963). Others, such as Gilbert Schiffman (1962), Supervisor of Corrective-Remedial Reading, Board of Education of Baltimore County, Maryland, consider the problem more serious than these figures indicate. His own extensive research yielded an estimate of 20 per cent to 40 per cent reading retardation in the normal school population when ability and not just grade level was considered. On a local level, the Minneapolis School Report, April, 1961, (p. 3) stated, "In one junior high school in which the median IQ is close to the city median, 20 per cent of the entering seventh grade students who have IQ's above 90 are two or more years retarded in reading." (This does not consider the criterion of ability in relation to reading level, except to exclude the poor students.) It is clear that reading retardation is not a small problem restricted to any one area.

The usual explanations for the difficulty or total failure which some children experience in reading fall into the categories of inadequate intelligence, sensory defects, emotional problems, inadequate teaching or irregular school attendance, poor environmental influences, lack of motivation and slow maturation.

There is a less well-known but important cause of reading retardation which has been of particular interest to the medical profession because it was originally observed as an acquired defect following trauma, disease or degeneration. At the present time it is most commonly referred to as dyslexia or sometimes, if the reading and language symptoms predominate, as specific dyslexia or specific language disability. Much of the present understanding of dyslexia has accumulated since World War II from research in neurophysiology and neuroanatomy. This research has had a profound effect on learning theories and knowledge of the brain's functioning. The renewed interest in the neural basis of behavior and associated problems of development which these theories and related research aroused has simultaneously increased research in dyslexia.

Dyslexia merits greater attention than it has had in the past, but "Medicine and pedagogy have been slow to come together in joint study of problems of mutual interest."(Money, 1962, p. 12) This is most unfortunate because it is important that treatment

by special instructional techniques, adapted to specific individual needs, be given early in order to overcome the disability and prevent secondary emotional and behavioral symptoms which develop from repeated failure in a vital academic skill.

The term "dyslexia" means defective reading. It refers to a hidden disability which is not dependent upon the commonly accepted causes previously cited, but upon subtle, intrinsic defects which affect neurophysiological functioning. However, classical neurological symptoms are seldom exhibited among dyslexics in the normal school population. In its developmental form, the form referred to in this paper unless otherwise indicated, the defects are present before reading is attempted and its etiology is generally unknown. Individual clinical pictures are extremely diverse as the symptoms may occur quite specifically in reading or be accompanied by a wide variety of concommitant sensory and behavioral deficits.

The prevalence of this disability can be only a guess until refined techniques are used in extensive testing to reveal its existence. Katrina DeHirsch, Director of the Pediatric Language Disorder Clinic at Columbia Medical Center in New York, considers 7 per cent of the average school population a conservative estimate when spelling and writing disabilities are included.

All investigators of dyslexia have noted a pronounced sex difference among their subjects; the greater the reading retardation, the greater the proportion of boys. Thus, reading disability exhibits the same sex discrepancy observed in all neurological, learning, and behavior disorders (Bentzen, 1963).

Dyslexia has no single set of tell-tale symptoms nor any single cause so that diagnosis is a major problem. The uniqueness of this entity is found in its whole configuration of symptoms, a situation, "not at all rare in physiological medicine....It is not too difficult to recognize the syndrome in older and teenage children whose failure to profit from reading instruction is severe and quite out of harmony with other developmental achievements." (Money, 1962) But in less severe cases, in younger children and in those with other developmental retardations, the diagnostic problem is acute.

John Money, Associate Professor of Medical Psychology and Pediatrics at Johns Hopkins University, has summarized the educational effects of inexact diagnosis in an excellent book on reading disability which contains the reports presented at the 1961 Conference on Research Needs and Prospects in Dyslexia and Related Aphasic Disorders. He has concluded, "From everything we know about children, we would expect that success in a program of remedial reading would be the greater, the earlier the child's deficits were detected and corrective measures instituted. Unfortunately, we still lack specific methods of distinguishing the true dyslexic from the child who is slow or late in learning to

read but who will learn still within the primary grades. Since our public school system is overcrowded and remedial reading is costly and often unavailable, it has become customary to delay the institution of corrective programs until the third grade or later when the true dyslexic will have segregated himself from the 'late bloomer'. This undoubtedly effects (sic) an economy from the standpoint of the administrator in that special instructions are not needlessly provided for children who are in any event going to learn. But this economizing is accomplished at a heavy cost to the dyslexic child. For by the time the remedial program is offered to him, he has had several years of failure, with a consequent development of aversion to reading and related activities, as well as of emotional problems related to feelings of inadequacy....It is evident that once we have specific methods of diagnosis that are reliable and are applicable in the field, this indiscriminate process of special tutoring will no longer be necessary." (Money, 1962, p. 4-5)

Dynamic Description

As one would expect, dyslexia is not a static condition and this compounds the problem of diagnosis. The observations of DeHirsch (1954, 1957, 1963a, 1963b, 1964) gleaned from thirty years of experience with reading retardation and language disabilities in children are particularly valuable in delineating the dynamic nature of dyslexia. A composite picture drawn from her writings portrays many dyslexics, during the pre- and early school years, as "immature" children whose perceptual, linguistic, motor and social skills are slow in development. They are often the children with a generalized awkwardness, frequently left-handed, who have difficulty in dressing, catching a ball, skipping, playing games like "Simon Says", drawing pictures or sitting still.

By the age of nine or ten, most of them have acquired a good oral background; hyperactivity has improved; generally, only fine-muscle coordination remains poor; and fewer perceptual immaturities persist, although, left-right discrimination is not secure in many. Reversals, condensations, and omissions of words are abnormally frequent in their reading but their reading disability has not been recognized, in most instances, by parents and teachers who continue to hope that the child will "outgrow" his difficulties.

It is not until adolescence that dyslexics who receive professional help are first referred, ordinarily, and then it is for generalized learning difficulties, behavior problems, or both. By then, the clues to the real cause of their problems have largely disappeared as their immaturities have been overcome or compensated. Some of the adolescent dyslexics remain wholly inadequate or non-readers while others have partially overcome their handicap but cannot read fast enough to handle class assignments in such subjects as history. Where reading signs have

improved or disappeared, evidence of the residual language disability can be found in messy, "ugly" writing, organizational weakness in language expression, too literal use of words and bizarre spelling. Most authorities on reading disability agree that writing and spelling characteristics provide significant evidence of the syndrome. Hermann (1959), the Danish neurologist, has written, "...it is a virtual rule that a person with a severe word-blindness (another term for the syndrome of dyslexia) is characterized by 'bad' handwriting." (p. 5) J. M. Gallagher has said that spelling errors made by these children are the best single diagnostic criterion, particularly when the words are not previously learned, as words written to dictation.

Dyslexics may achieve very well in mathematics, science, or non-academic areas if they have not withdrawn from learning altogether and adopted an "I don't care" attitude to avoid defeat. Their emotional and behavioral problems so dominate the picture by adolescence that too often, "Overemphasis on intrapsychic processes /in learning difficulties_/ leads to neglect of the neuropsychological and maturational factors that might be highly significant." (DeHirsch, 1963a, p. 91) The emotional overlay that develops secondarily to reading disability is not at all unexpected as, "It is evident that children with marked incompetence in an area so vital to their ego-attitude, and sometimes to their survival in today's world, will suffer inordinately. Often bright, perceptive, and sensitive, they tend to react successively with anger, guilt feelings, depression, and, finally, resignation, and compromise with their hopes and aspirations. The fact that he appears normal and is so except in the one area of his deficiency compounds his problem." (Rabinovitch, 1962, p. 78) It is especially interesting that the Hawthorn Center, a well-known reading clinic, originated because Rabinovitch discovered that many of the boys referred to the children's psychiatric clinic at the University of Michigan could not be helped until their reading problems were also treated.

It should be noted that Rabinovitch is referring to the group of dyslexics without obvious concommitant symptoms; however, many, probably the majority, of dyslexics do not exhibit as uncomplicated a picture as his quote implies.

Visual Perception

The salient feature of this syndrome is the dyslexic's difficulty with spatial direction and sequential order. It differs from the mistakes of normal beginning readers in duration and degree. Directional confusion in reading manifests itself at the outset in oppositely oriented letters (b-d; p-q; u-n; m-w; s-z; q-b), and difficulty with sequential order appears in reversal of the position of letters and numbers (won-now; was-saw; 14-41), translocation of letters (abroad-aboard), confusion of words with similar configurations (quiet-quite-quit) and word-by-word oral reading. Even uncertainty about which way to work through arithmetic computation may be one more symptom of the same difficulty. (Hermann, 1959)

Mirror printing of single words (ʎɹɐɯ) or whole sentences (ɔoɔ ∀ ƎƎƧ I) is one of the most striking dyslexic errors and has often suggested the possibility that the reading problem may be due to visual problems. A number of investigators have, in fact, found that eye accommodation, fusion, coordination and motility are sometimes responsible for reading difficulties and that these are not problems of visual acuity which can be detected by the far-point vision tests used in the schools. (Spache, 1965; Vernon, 1957; Harris, 1961) Development of these visual-motor skills may vary considerably from one child to another due to experiential differences and innate variables. (Vernon, 1962) They can also be sequelae of disease or trauma and may be accompanied by a variety of other symptoms associated with brain injury -- perceptual, motoric, conceptual and behavioral deficits. (Wechsler, 1963; Prechtl, 1962a, 1962b; Vernon, 1962)

Many dyslexics' visual problems are not restricted to symbolic material, and a general visuoperceptual disability is implied in some cases of reading disability with such clinical evidence as abnormal reaction time to visual stimuli in apparent motion tests, faulty color discrimination or deficient form perception. "Very poor ability in analyzing visual objects, in perceiving their parts accurately and in grasping how the parts fit together may be suggestive of neurological defect." (Harris, 1961, p. 229)

Inadequate visual perception, per se, is not considered the cause of dyslexia, although the proper interaction of all visual skills is important in establishing the auditory-visual relationships essential for reading and spelling. These sound-symbol relationships are deficient in the dyslexics and comprise the syndrome's essential feature, but it is not a symptom which is always attributable to a reading disability. It may, of course, be the result of inadequate teaching, in which case, most of the associated symptoms of dyslexia will be missing.

Auditory Perception and Speech

From the early studies of Orton and Monroe to the current investigations, "Research has indicated that poor readers are significantly inferior to good readers in auditory discrimination." (Goetzinger, 1960) Inadequate teaching may be increasing the dyslexic's problems if it is true that, "No current basal reading system provides adequate ear-training for the non-reader and most supplementary phonics programs neglect it." (Durrell, 1964, p. 88) Most dyslexics require even more intensive training than the normal child in selective listening.

Accurate auditory perception is equally as important as visual perception in the development of good reading skills, as both auditory and visual information reinforce each other in establishing symbol-sound equivalence. "Unfortunately, ⌈developmental

dyslexia 7 is widely thought of as a condition where visuo-spatial difficulties are all important...auditory discrimination, synthesis of the spoken word are more important." (Ingram, 1963, p. 200)

Auditory difficulties in discrimination, recognition and recall affect the development of speech so that many dyslexics have an early history of slow, erratic speech development with articulatory errors. In these cases, the logic of regarding dyslexia as just one aspect of a larger area of language problems can be readily apprehended. Language impairment involves different anomalies which occur in the developmental process toward good communication--aphasia, delayed speech, stuttering, retarded reading, poor spelling and handwriting, and the level of least disorder in which performance in reading and composition falls within the normal range but is considerably below mathematical performance. (Delecato, 1963) Bender has said that aphasia exists as a transitory phase in some developmental disorders such as language retardation (often present as reading retardation) because it is present in 10 to 15 per cent of all boys.

"Perhaps more often than is commonly thought dyslexia is clearly relatable to certain diagnostic categories used to describe aberrant speech... [that are] relatable to some forms of profound hearing impairment...which reflects disorders of auditory discrimination and recognition." (Hardy, 1962, p. 172) Rabinovitch (1959) and others have pointed out that, "Learning difficulties involving aphasia(1) are common and often unrecognized."(p. 859)

Neurologists have found an irresistible source of analogies between the speech, reading, and writing errors of adult aphasics with acquired dyslexia and children with developmental dyslexia. Developmental aphasia actually affords more parallel inferences than acquired aphasia because in addition to the dyslexic symptoms, its etiology is also generally unknown (except in cases of Rh blood incompatibility); diagnosis is equally difficult; it is characterized by delayed language development; and, most important, developmental deficiency and not loss of previously learned skills is involved, as is likewise true in developmental dyslexia.

DeHirsch has reported that a large percentage of three, four, and five year-olds originally referred to the Language Clinic at Columbia for delayed or infantile speech were later dyslexic.

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(1) Aphasia is "an interference of language processes resulting from brain injury" which causes "a reduction of available language in all language modalities which may or may not be accompanied by perceptual or sensorimotor deficits affecting auditory recall, word recognition, and language formulation." (Schuell, H., Jenkins, J. J., and Jimenez-Pabon, E., 1964, p. 336)

Children whose speech development is slow or erratic, as in mild cases of aphasia, often show symptoms of faulty articulation, reliance on gesture and slow comprehension which prompt puzzled parents and teachers to request hearing tests. (Ingram, 1959; Eisenson, 1963) Unfortunately, the customary audiometry tests assess only sensitivity to auditory stimuli (acuity) and not the other two basic functions of the auditory mechanism -- auditory discrimination and recognition -- which may be defective. Consequently, conditions which should receive attention are too often attributed to poor mental endowment, inadequate motivation or unusually slow maturation.

Auditory discrimination can be tested by requiring a subject to match spoken nonsense or real words to their written forms or by differentiating paired words as "like" or "different". Nonsense words can also be presented serially to test auditory memory span. These tests disclose the dyslexic's and the aphasic's confusion of short vowel sounds (as bend mistaken for band), consonant sounds (most commonly, p for b; m for n; s for z; d for t; l for r; f for v) and omissions or additions of sounds (trap for tap).(1)

Delays in language development, poor auditory retention, errors in speech and reading and poor spelling due to poor auditory discrimination are relatively easy to understand; whereas, the peculiar grammatical constructions and word errors heard in the speech of some dyslexics, with or without deviant articulation, are most puzzling. Prefixes and suffixes of words may be dropped or confused so that a word like "destruction" becomes "construction" or even results in a neologism like "restruction"; distortions such as "ensify" for "emphasize" are also quite common; and phrases such as "quite a many people" appear. "More confusing are the reversals of concepts, for example, hostile for hospitable, floor for ceiling, go for stop. Confusion of direction is often heard from these children, east for west, up for down, under for over; and time sequences also can be reversed: first for last, now for later, seldom for often." (Saunders, 1962)

Neurological Abnormalities

Closely associated with poor speech are motor incoordination and other motoric disorders. Many writers have speculated on the neurological implications of the non-specific awkwardness, hyperactivity, and frequent left-handedness in some dyslexics. Cohn's (1961) detailed study comparing normal school children with overactive, aggressive children considered by their schools to show "specific" reading and writing difficulties gave clinical evidence of a "generalized brain dysfunction". One of the most

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(1) Vernon (1957) has cautioned that these same errors may be indicative of high frequency deafness, a condition often unrecognized, which shows up on the Seashore Test of pitch discrimination.

valuable leads to this type of reading disability with non-specific lesions of the central nervous system is the recent report of the choreiforme syndrome discovered in a group of hyperactive children, also with no obvious neurological impairment. (Prechtl, 1962; Prechtl and Stemmer, 1962) It is a hidden motoric disorder affecting muscles of the neck, face, and tongue. Of this group, 90 per cent had more or less severe reading difficulties. In each of these cases with reading difficulty, eye muscles were affected, and in many instances, delicate movements of the hands were affected also. Excessive restlessness, uncontrolled behavior, poor school ability, accident-proneness, good basic intelligence and difficulty with right-left discrimination characterized most of his subjects.

Kawi and Pasamanick's (1959) well-controlled, epidemiological study of the medical histories of 372 boys from the Baltimore public schools who were retarded in reading and the histories of a control group of normal readers gave clear evidence of the higher incidence of prematurity, maternal complications (especially toxemias and bleeding during pregnancy), and to a lesser extent, abnormal birth experiences among the poor readers. Statistical differences were greatest among the sub-group of retarded readers classified as disorganized and hyperactive. Postnatal injuries and illnesses were not included in this study.

Another study (Knobloch and Pasamanick, 1959) specifically on prematurity -- a condition associated with poor language development and learning difficulties (DeHirsch, 1964) -- brought out several pertinent points on neurological defects. Test results on 500 premature infants and 492 full-term infants, examined at 40 weeks and again at three years of age, verified the existence of a continuum of cerebral damage present in infants, ranging from severe abnormalities to minimal damage, and also ascertained that, "The number and severity of abnormal neurological and behavioral patterns recorded varied directly with the severity of the clinical neurological diagnosis." (p. 1384) Even at the young age of these subjects, the incipient diagnostic problem was apparent in the remark that, "with increasing age, there is a shift to less severe involvement." This improvement with age substantiates other information on the tremendous recuperative powers of the infant brain.

Cohn (1962), too, noted that clinical tests lose their value for the group of retarded readers in his study after the age of eight years. Cerebral dysfunction in the brain-injured adolescent is often no longer manifest in the "spotty" (high-low discrepancy) subtest scores of intelligence tests even in cases with this earlier clue. In fact, Laufer (1962) has said that after the age of 12, the syndrome of brain injury may not be functionally present at all; only the sequelae -- distorted self-image and damaged interpersonal relationship -- may remain. It is important to note that age is a most important factor in any study or comparison of symptoms in dyslexia and one that has not been properly controlled in many of the correlation studies cited in the literature.

On the subject of neurological testing, it has been repeatedly stressed that definite neurological abnormalities are gross symptoms primarily of the peripheral and not the central nervous system.

A twenty-year neurological study by the U. S. Public Health Service should eventually elucidate many of the organic causes of poor speech, reading and writing because performance test results in these areas are being compiled for comparison with extensive test data and complete childhood histories extending from the prenatal period to the age of 12 years on the 50,000 children participating in the project. It is hoped that the evaluation scheduled for 1978 will make it possible to identify early signs of future physical, mental and neurological difficulties and also prevent their occurrence. Early identification and prevention of damage to the central nervous system is extremely important because, "Brain injury is the largest physically handicapping condition in the nation." (source from Quast, 1957) "This group of children [handicapped by brain injury] is much larger than many workers recognize and facilities for both their diagnosis and appropriate schooling are sadly lacking." (Rabinovitch, 1959)

In speaking of the brain-injured child, it must be realized that the term encompasses any damage to the central nervous system from the moment of conception onward and that the effects of damage vary widely with the time of occurrence and degree of damage. Damage may occur at any time due to toxins, innoculations, anoxia, nutritional deficiencies, injuries and the diffuse incephalitic sequelae from almost any infectious disease -- pneumonia bacterial meningitis, whooping cough, scarlet fever, measles, etc.

Many authorities on dyslexia have emphasized hereditary causation rather than brain injury, and the chief impetus for ascribing reading disability to genetically determined factors has come from the higher than normal incidence of left-handedness and slow language development in dyslexics and their families. Orton's theories attributing a direct relationship of "handedness" to cerebral dominance have been refuted, but they increased interest in the neurological aspects of reading and spawned many studies of laterality. Probably one of the essential points that was missed by early investigators is found in Delecato's caveat that it is a mistake to equate handedness with complete maturation.

Many of the studies of laterality can be criticized because the investigators' determinations of handedness were much too naive in the light of present knowledge. Research using Benton's refined tests of laterality (Mountcastle, 1961) revealed that 12 per cent of a "strongly right-handed" group of subjects actually showed superiority of the left hand. The "strongly left-handed"

showed superiority of the right hand in 15 per cent of the cases and only left-handed superiority in 55 per cent of the cases, with the other 30 per cent being ill-lateralized. Even more confusing was the fact that laterality varied with the particular skill being tested. Despite the questionable validity and conflicting results of many of these studies, Zangwill (1962) has maintained that there is sufficient evidence from sophisticated studies, including his own, to support the belief that dyslexia is associated with left-handedness, weak lateralization and patterns of mixed dominance in which an individual's eye, hand and foot preference is not for the same side. This association does not mean that deviant handedness is the cause of dyslexia but, more likely, that both conditions are present in an individual because of a common cause.

The exact relationship of laterality to cerebral organization of the brain is not clear. Abnormal brain waves, complications of birth, minor epilepsy and brain illness have been associated with left-handedness and weak lateralization in studies mentioned by Penfield and Roberts (1959) and Zangwill (1962). However, these findings of an association between non-genetic factors and left-handedness do not necessarily exclude genetically-linked anomalies such as enzyme abnormalities which interfere with normal cerebral development that could be causative factors.

Auditory-Visual Relationships

Disturbance of the auditory-visual relationships is an ubiquitous feature of dyslexia which causes difficulty in establishing symbol-sound relationships necessary for the ability to read, write and spell. "As Pavlov (1927) has pointed out, one of the first phenomena to be effected (sic) by damage to the central nervous system is the degree to which different sensory avenues may become equivalent one to the other. Whereas, in a normal mammal with an intact nervous system, visual stimulation readily can be conditioned to become equivalent to tactual or auditory stimulation, in the damaged organism, the development of such equivalence and their stability may be markedly disturbed... One hypothesis which stems from the analysis of intersensory processes is that some individuals with reading disability are disabled precisely because they have nervous systems in which the development of equivalences between the sensory systems is impaired...Thus far, our findings suggest that disturbances in visual-tactual and visual-kinaesthetic relationships are far more frequent in the dyslexic segment of the population than among nondyslexic children." (Birch, 1962, pp. 167-168)

The inability of dyslexics to associate visual symbols and auditory sounds systematically and correctly is well-known, but this inability to make accurate judgments of auditory-visual equivalence is not restricted to symbolic material as shown in a recent study by Birch and Belmont (1964) in which boys of 9.5 to 10.5 years

of age (an age beyond the normal maturation of these auditory and visual skills) were required to identify dot patterns corresponding to rhythmic auditory stimuli.

The fact that deficiencies in sensory equivalence reflects neurological abnormalities in many cases does not mean that all such disturbances exist for this reason. Intersensory relationships are also affected by the functioning of basic perceptual skills which may be delayed because of sensory deprivation, innate factors or lack of experiential opportunities at the optimum time as well as brain injury which is one of the major causes of developmental retardations. (Hunt, 1961; Vernon, 1962; Frostig, 1963) One of the major questions for research is whether or not uncorrected developmental lags which occur initially because of environmental conditions can cause actual neurological defects in the neurological substrata subserving higher levels of intellectual functioning. Hand in hand with that question is the one, "How long can defects persist and still be corrected?"

When these questions are answered and more is learned about behavioral manifestations arising from specific deficits in different brain mechanisms, perhaps "educational prescriptions" will be possible for all cases of learning disability. And perhaps early diagnosis and treatment of children with reading disability will be the rule and not the exception. Greater application of multisensory approaches and use of enhanced perceptual cues in the teaching of reading for all children might also be anticipated if teachers themselves understood the basic reasons for their use.

Treatment

Early Educational Therapy

The dyslexic's need for early treatment has probably been stressed more than any other one thing. Some writers believe that the best solution may be special training instigated before first grade in the period of time that is crucial as far as certain maturational processes are concerned. The reasoning for this derives from the belief that, "It is far easier and more effective to provide educational therapy for a child of preschool age than for one who has become accustomed to faulty modes of functioning and has suffered the traumatic experience of school failure. The notion that a child does not need immediate treatment because he will probably mature later is usually falacious and can do inestimable harm...It cannot be too much emphasized that delay tends to compound developmental and learning difficulties rather than resolve them." (Sands, Frostig and Horne, p. 157) The belief that delay compounds learning difficulties refers not only to secondary emotional involvements but also to distortion of the sequential and pyramiding development of intellectual abilities.(1) Gallagher has added another reason

(1) See Mark (1962) and Hunt (1961) for a succinct summary of the theory involved for an explanation of its basis.

stemming from developmental psychology, "The higher level intellectual functions appear to develop slowly when their natural course of development has been interrupted...If conceptualization at a higher level must build on wide varieties of experiences, then waiting too long a time to institute these experiences may result in conceptualization never developing to its original potential." (Gallagher, 1960, p. 165)

There may be a very practical reason that educators will eventually accept the procrustean solution of special training to prepare not only the culturally disadvantaged child but also the developmentally disadvantaged child to function on the same level as his peers at the beginning of first grade. Teachers who recognize the wisdom in the old adage, "teaching must start where the learner is", are faced with frustration by the limitations of lock-step education and overcrowded schoolrooms which preclude the individual attention that a wide range of individual differences demands. Preparation of a child so that he can profit from his educational opportunities is possible because developmental retardations are amenable to training and can be speeded up so that successful learning can continue at the pace of a regular school program. This early therapy is also of great value to children with severe learning disabilities which necessitate prolonged help.

Many of the techniques already found useful in surmounting delayed maturation have been discussed in the writings of Kephart (1960), Jolles (1958) and Strauss and Lehtinen (1947). Some of the most intriguing possibilities for "intellectual orthopedics", to use Binet's term, have issued from Luria's results (1960) with conditioned-response experiments which demonstrated that both abnormal performance and normal developmental expectations could be modified decisively <u>if</u> the learning situation was correctly structured by the use of additional sensory or verbal information, <u>initially</u>.

Implicit in the espousal of early educational therapy is the conviction expressed by Hunt (1961) that, "Assumptions that intelligence is fixed and that its development is predetermined by the genes is no longer tenable.

In the light of these considerations, it appears that the counsel from experts on child-rearing during the third and much of the fourth decades of the twentieth century to let children be while they grow and to avoid excessive stimulation was highly unfortunate...Moreover, inasmuch as the optimum rate of intellectual development would mean also self-directing interest and curiosity and genuine pleasure in intellectual activity, promoting intellectual development properly need imply nothing like the grim urgency which has been associated with 'pushing' children." (Hunt, 1961, p. 362)

Recognition of developmental anomalies at the preschool and early school ages is important because they are sensitive indicators of early academic difficulty (Frostig, 1963), and on the basis of Bentzen's (1963) research involving over 6,000 public school pupils in Maryland, it can be anticipated that two thirds of all learning problems at the first-grade level will include reading problems. Also, two thirds of these reading problem cases will be male. As to the prognosis for such children, she summed it up, "It was our impression that these youngsters, identified in the first grade as too immature for the school experience, were [the ones] who would present severe instructional and emotional difficulties by the fourth grade...Such children do not 'outgrow' their difficulties."

Multidimensional testing of the children with developmental lags is essential to obtain results which are useful to the educator because development does not proceed evenly, not even in one sensory area. For instance, visual perception is not a unitary phenomena but a composite of many abilities -- perception of form, position in space, spatial relationships, color discrimination, real motion, apparent motion and so on -- thus compelling independent assessment of each skill if remediation is to be geared to specific deficiencies and not to be attempted by a "shot-gun" approach. Auditory perception is also made up of many factors each having its own developmental rate (Wepman, 1961), and the same is true of motor and linguistic abilities as well (DeHirsch, 1964; Jenkins, 1964). Some of these skills show a higher correlation to certain specific reading skills than others, as oral reading to motor disorders, and reading readiness tests are based upon some of these relationships.

Time alone does not automatically amend the inadequacies underlying learning problems; some children require more specific types of experiences to develop the skills which the majority of children acquire with little effort, almost spontaneously as part of their normal development. This is clearly illustrated by the fact that, "Even at the secondary level, severely retarded pupils [in reading] have trouble with basic auditory and visual discrimination skills that the average six-year-old child taking his reading readiness test could easily pass." (Schiffman, 1962, p. 53)

Readiness Rooms

Osseo, Minnesota's experience with "readiness rooms" is a good local example of preventive therapy which has proved successful. School personnel and parents there are willing and eager to have one out of every eleven children add an extra year of preparation between kindergarten and first grade because the extended training has helped the unfavorable educational prognoses of the children selected. The additional year spent in the readiness room substitutes for the year of retention which is liable to occur

at a later time in the child's elementary school years. Ordinarily, once children fail, they seem to stay in the bottom group within the class so that it has been very gratifying to all those concerned that most of the children from the readiness room go into the middle or top groups in first-grade reading. In addition, they carry with them attitudes of self-confidence, "liking-for-school" and better work habits which the teachers have instilled.

Regular consultations between the reading consultant, psychologist and readiness teachers encourage constant reappraisal of techniques to improve auditory, visual, and number backgrounds in these "immature" children. Alice Tuseth, Osseo psychologist, attributes the success of the program, now in its fourth year, to the ingenuity of the teachers, their willingness to share new ideas and try new things, as exemplified by their trial of special techniques to develop visual-motor coordination.

Much research is necessary to determine the effectiveness of perceptual and sensorimotor training in preventing dyslexia, but whether or not it is wholly or partially successful, there seems to be a growing number of clinicians who advocate an attack on reading retardation at this level of development.

Evaluation

For children with severe learning disabilities, early therapy is most beneficial and has the added advantage of focusing attention on them at an age when the true nature of their difficulties is easier to detect. Readiness rooms afford an unequaled opportunity for the diagnosis in a natural setting that children handicapped by learning disabilities need. Just as the observations of kindergarten teachers furnish valuable predictive information for placement in readiness rooms, so the insights of "readiness" teachers into attention span, learning ability, reasoning power, perceptual skills, motor abilities, language habits, work habits, attitudes, moods, family stresses, past experiences and general level of knowledge can augment psychological test results with information which is indispensable for reliable educational planning. (One might guess that even a small amount of guidance in observation of pertinent factors for these teachers might yield valuable dividends in accurate psychological appraisal.)

The potential of children with developmental retardations is frequently not assessed accurately by intelligence test scores alone; children with slow language and/or visual-motor development are often underrated by 20 to 30 IQ points. (Eisenson, 1964; Taylor, 1959; DeHirsch, 1963)

It is obvious that reassessment should be made often enough for children with learning difficulties that educational goals can

be reevaluated in terms of changes in intellectual functioning and other conditions which contribute to the final outcome -- health, family attitude and school facilities. Too often, however, results from psychological testing, especially from standard intelligence tests, are not used as guides to action but as restrictive measures. In fact, intelligence testing is the source of widespread concern because of the restriction in most school systems which limits special reading instruction to students with an IQ score above a prescribed level -- generally, 90 points. (Austin and Morrison, 1963)

The prime objection to this practise is that, "If teachers are to use present intelligence tests properly, they must realize that a low score on a group intelligence test which involves reading is not a true test if the child is a poor reader...Even the scores on individual tests of intelligence, such as the Stanford-Binet are influenced to some degree by poor reading ability.../ and this effect / tends to increase as the difference between mental age and reading age of the poor reader increases... In summary, then, before concluding that a child is in difficulty because of inadequate general intelligence, the teacher must be sure that the measurement used gave the child an adequate chance to demonstrate his true capability and did not reflect his learning difficulty." (Brueckner and Bond, 1955, p. 33-34)

Even using the Wechsler Intelligence Scale for Children (WISC), an individual IQ test in common use, "Evidence was found that low scores obtained by children who have reading difficulties frequently reflect their degree of retardation rather than their basic capacity to learn." (Schiffman, 1962, p. 50)

Under these circumstances alone, it is not surprising that the New York City public schools no longer use intelligence test scores.

Likewise, diagnosis which achieves only a label is useless, in fact, often a detriment because of the pessimism which surrounds conditions attributable to cerebral dysfunction. As Balow has said, it is an individualized dynamic diagnosis which is essential for educational planning. (in A. Anderson, 1961)

Encouraging efforts are being directed toward this type of diagnosis so that the day may not be far away when educational prescriptions for specific methods of teaching can be written for a child with learning disabilities on the basis of clinical test results indicating intact and deficient cerebral mechanisms. Some of this is possible to a limited extent already, presaging the resolution of a major educational dilemma with dyslexics -- matching the reading instruction to the child.

Hardy (1965), speaking on the language disorders in children, has summed up the current situation in these words, "Useful

descriptions in depth of affected children can ordinarily be elicited only from what is sometimes called 'diagnostic testing', the long procedure of taking each child through careful, ordered and modality controlled learning situations..." (p. 6) Educators need to know which modalities for experiences and learning are intact and which are not and whether "interferences in the central nervous system involve problems of sensory integration, of language comprehension, of formulation, of spontaneous expression or of imitation." (p. 6) Since this need is not yet met, the use of brief sample lessons is adviseable for children with reading disability, according to Harris.

Kirk and McCarthy have endeavored to fill this gap in clinical testing with the Illinois Test of Psycholinguistic Abilities, which is designed for differential diagnosis of language ability in its various receptive, expressive and central integrating processes. Mark's theoretical formulations of a "behavioral classification system", also drawn from neuropsychological learning theory as is the ITPA, portends the encompassing type of diagnosis possible when a systematic process for analyzing thinking disorders is available to provide a reliable basis, "especially in such dysfunctions as communicative disorders and reading disabilities" (p. 85), for description, prognostication in all areas of behavior, estimated remission rates and recommendations for specific avenues of learning.

In the meantime, those tests which can divulge the nature of reading problems which are available should be used so that plaintive requests, such as the one from a Minneapolis reading center teacher suggesting that eye and ear examinations and individual intelligence testing be done before the child enters a reading center, will not occur. Schiffman's proposed list of tests for a complete reading analysis of retarded readers includes the usual case history (developmental, social and familial), individual intelligence testing, personality evaluation, physical screening, comprehensive reading battery, tests for associative learning, for memory span, for laterality, for perceptual development (Frostig, Bender), for aphasia (Eisenson) and visual and auditory discrimination tests.

Reading Instruction

"At the present time, it is recognized that comprehension is a major goal in reading instruction, but that good comprehension cannot be achieved by one who has failed to develop skills in word recognition." (Harris, 1961, p. 315) "A child who is cudgeling his brain to remember what a row of letters says is not reading for sense." (Gillingham and Stillman, 1940) Therefore, since children with dyslexia are characterized by difficulty in establishing an adequate approach to new words and retention of those words, the decoding process is of prime importance in reading instruction for disabled readers. A multisensory approach,

use of exaggerated perceptual cues and learning by generalizations rather than rote memory have proved most successful with dyslexic readers, whereas the approach which is primarily dependent upon visual memory (commonly referred to as the "whole-word" or "look-say" method) is inadequate for dyslexics.

In the multisensory approach, concurrent activity of seeing, hearing, speaking and writing or typing is encouraged in order to reinforce weak sound-symbol relationships by indirect links through other sensory pathways. The work of Eisenson (1964) and McGinnis (1963) with aphasics indicates that different sensory modes should be employed initially to teach children with some specific disabilities causing dyslexia. But even in aphasia, where the auditory step follows acquisition of the visual-kinaesthetic relationships for a letter or word, the auditory step is not omitted. For many children "selective listening" is a necessary first step. Training in auditory discrimination and analysis "serves not only to lay the foundation for independent word recognition but often is the means of acquiring even the first words of a reading vocabulary...For such a child, early awareness of the possibilities of auditory analysis adds another means of structuring his perceptions of the reading material." (Strauss, 1947, p. 177) Pictures of familiar objects or replicas of them also help the child to remember difficult sounds or letters; a bunny, for example, can serve as the indirect link, because of its meaning for the child, to aid memory for sound-symbol equivalence for "b", and if it is a bunny which can be handled, so much the better. Tactual stimulation is useful in severe cases.

One of the best visual cues to lend added vividness for clearer perception is color. Color can be used to focus attention on any aspect of a word's configuration which causes special difficulty -- on vowels, consonants, word endings or beginnings. The "words in color" approach is a rather elaborate example of the use which can be made of this valuable cue. There is a very good neurological explanation of the success which can be achieved with color: "color perception and responsiveness to color remain intact in spite of the severest disturbance of perceptual or general integration.../ and it / develops on an earlier genetic level than perception of form[1] and is therefore easier." (Strauss, 1947, pp. 136, 154)

Kinaesthetic clues from the muscles, joints and tendons used in speech and writing are very important in establishing auditory-visual relationships. Reading in a low voice or articulating subvocally is encouraged, not curtailed, because weak intersensory patterning is strengthened by additional auditory and

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[1] Accurate form perception necessary for correct perception of letters is often aided in the early stages of instruction by the use of tactual discrimination of raised letters or sandpaper letters.

kinaesthetic stimuli. Strauss has explained, "We have found that too early inhibition of peripheral movements of articulation distracts the child from arriving at the sense or thought of the material read." (p. 182) (Criticisms that this encourages slow reading seem to be irrelevant with a child who might be a non-reader or slow reader by any other method.)

Writing "is an important adjuvant in learning to read, partly through its stimulating and organizing effect upon visual perception of words and partly through the additional kinaesthetic factors involved." (Strauss, 1947, p. 184) Kinaesthetic sensations can be exaggerated by tracing or copying large letters at the blackboard, in the air or in a clay pan. Writing, in the multisensory method, begins with reading and proceeds through orderly steps of tracing (if necessary), copying and to dictation. It is taught with explicit directions for formation of the letters. Spalding (1962) has recommended directional arrows on a tracing model and augmented her instructions for writing with analogies drawn from a clock and the positions of its hands. Script has the advantage over printing because it reduces reversals through its left-right sequence of movements. Slow pronounciation of each word as it is written adds another sensory dimension, the auditory, to facilitate accurate sequencing of letters.

Particular emphases and specific techniques vary in the multisensory approach, but highly structured teaching that starts with simple units and moves to the complex is common in all individual interpretations. Generalizations possible at each step are made explicit by the teacher and not left to spontaneous recognition. Attention is channeled to significant relationships at all levels of perception -- discrimination, analysis and synthesis.

Many dyslexics who have not received early help have developed strong expectations of failure so that an easy beginning with concrete rewards for small accomplishments is necessary to build feelings of success. Once this is established many develop tremendous motivation and attentiveness. (Bender, 1956) Intensive training over a prolonged period of time with attention to other language problems is essential for many dyslexics. Ideally, Junken (1960) has said, the tutor should "insist on more than average performance from a child before return to the class situation in order to assure academic adequacy necessary for full acceptance by classmates..." (p. 275)

Unfortunately, it is one thing to know what the child with reading disability requires and quite another to be able to provide it.

The thorough testing recommended by Schiffman has been stressed by many writers, but the Harvard report on reading is discouraging on this point. "What has apparently been overlooked were the

two points made by two authorities...Guy Bond and M. A. Tinker in Reading Difficulties: Their Diagnosis and Correction... [that it is] necessary to explore many traits in the individual child as well as his reading skill and abilities...physical, sensory, emotional and environmental factors that impede progress." (Austin and Morrison, 1963, p. 123)

In this same Harvard report on reading, little more than one third of the 940 United States public schools systems reported that they employed special teachers for remedial reading, yet many classroom teachers felt inadequate to undertake such a program without specialized training. Even if disabled readers pass the restrictions on intelligence, reading achievement scores ("most services were for those just below grade level", p. 120) or emotional behavior and were admitted for remedial instruction, the methods and materials would not vary greatly from those in classroom reading programs which had already proved ineffective, according to their information. Very few reported use of the kinaesthetic approach, "reading laboratories" or mechanical aids.

In summary, then, present prospects for dyslexic children are not favorable; diagnosis is difficult and seldom available; special methods of instruction for specific individual needs are scarce and seldom instituted early enough to avoid emotional repercussions. However, knowledge about dyslexia is accruing and some programs for learning disabilities are becoming available to a few children whose reading disability has been diagnosed. Hopefully, successful remediation of even a small number of dyslexics may encourage further efforts on behalf of the others.

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